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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/749,019	12/29/2003	Sujian Huang	05516/056003	8429

7590 10/31/2007
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EXAMINER

SAXENA, AKASH

ART UNIT	PAPER NUMBER
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2128

MAIL DATE	DELIVERY MODE
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10/31/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

<p align="center">Office Action Summary</p>	<p>Application No.</p> <p align="center">10/749,019</p>	<p>Applicant(s)</p> <p align="center">HUANG ET AL.</p>	
	<p>Examiner</p> <p align="center">Akash Saxena</p>	<p>Art Unit</p> <p align="center">2128</p>	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 06 August 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 34-38 and 45-50 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 34-38 and 45-50 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

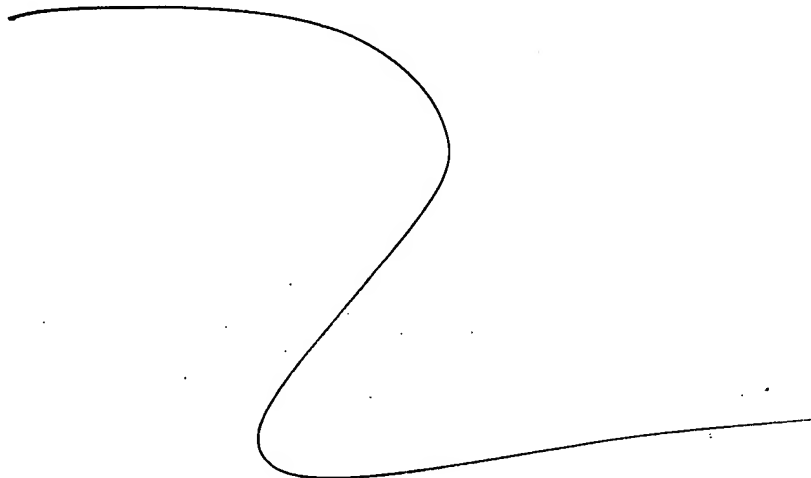
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| <p>1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)</p> <p>2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)</p> <p>3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
 Paper No(s)/Mail Date <u>06/06/2007</u>.</p> | <p>4) <input type="checkbox"/> Interview Summary (PTO-413)
 Paper No(s)/Mail Date. _____</p> <p>5) <input type="checkbox"/> Notice of Informal Patent Application</p> <p>6) <input type="checkbox"/> Other: _____</p> |
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DETAILED ACTION

1. Claims 34-38 and 45-50 have been presented for examination based on the application filed on 6th August 2007.
2. Claim(s) 34, 45 is/are amended.
3. Claim(s) 1-33 & 39-44 were previously cancelled.
4. Claim(s) 34-38 and 45-50 are rejected under 35 USC § 112¶1st and ¶2nd.
5. Claim(s) 34-38 and 45-50 are rejected under 35 USC § 102.
6. The arguments submitted by the applicant have been fully considered. Claims 34-38 and 45-50 remain rejected and this action is made NON-FINAL. The examiner's response is as follows.

Response to Applicant's Remarks on Previous Rejection

7. Examiner withdraws the objection to the drawings filed 21 October 2004, under 37 CFR 1.83(a) in view of applicants amendment to the claims.
8. Examiner withdraws the only the claim rejection(s) under 35 USC § 112 to claim(s) 34-38 and 45-50 in view of the applicant's amendment, relating to "graphically displaying the formation".



Claim Rejections - 35 USC § 112^{1st}

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

- 9. Claim 34-38 and 45-50 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.**

Regarding Claim 34-38 and 45-50

The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. Specifically, independent claims 34 and 45 recite the limitation “a selected number of incremental rotations” that has not been clearly and concisely defined by the specification. The examiner notes that, while the specification makes reference to selecting bit design parameters, drilling parameters, and earth formation parameters (paragraph [0011], and selecting an incremental angle (paragraph [0033], it appears to be completely silent on any teaching of “a selected number of incremental rotations”. Hence a skilled artisan would be at odds to determine how a user would realize a selected number of rotations from the limited information contained in the specification.

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Dependent claims 35-38, and 46-50 inherit this defect. This rejection was presented previously and clarification is requested.

Further, Claims 34 and 45 disclose newly amended limitation of "outputting the volume cut by each of the roller cones". Applicant has pointed to [0040] and [0048] for support for this limitation. These paragraphs neither disclose volume cut by roller cones nor the volume cut for each of the roller cone. Hence the claim is not enabled for "outputting the volume cut by each of the roller cones."

Dependent claims do not cure this deficiency and are rejected for the same reasons.

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Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

10. Claims 34-38 and 45-50 are rejected under 35 U.S.C. 102(b) as being anticipated by article published in SPE as “Drag-bit Performance Modeling” by T.M. Warren et al (Warren hereafter).

Regarding Claim 34

Warren teaches a method for determining a volume of formation cut by each one of a plurality of roller cones on a drill bit drilling in earth formations (Warren: Table 1 Cut volumes), comprising selecting bit design parameters, comprising at least a geometry of a cutting element on the drill bit (Warren: Pg.119 Col.2 ¶2-3, Fig.2-4); selecting an earth formation (Warren: Pg.119 Col.2 ¶2-3) as selecting from earth formation from Catoosa shale, Indiana limestone, Berea sandstone and Carthage marble; calculating from the selected bit design parameters and the selected earth formation, parameters for a crater formed when each one of a plurality of cutting elements on each of the roller cones contacts the earth formation, the parameters including at least a volume of the crater (Warren: Pg.119 Col.2 ¶6 Fig.6) as bottomhole pattern profile and volume (Warren: Table1); incrementally rotating the bit, and repeating the calculating of the crater parameters through a selected incremental angle of rotation (Warren: Table 1) as calculation of cut area and cut

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volume with a given rotation velocity; combining the volume of each crater formed by each of the cutting elements on each of the roller cones to determine the volume of formation cut by each of the roller cones (Warren: Table 1 – cut volume by each cutter); and outputting the volume cut by each of the roller cones (Warren: Table 1 – cut volume by each cutter).

Regarding Claim 35

Warren teaches determining an axial (vertical) force on each of the cutting elements (Warren: Table 1 – Vertical force on each of the cutters); calculating, from the axial force on each of the cutting elements, an expected depth of penetration and projected area of contact between each of the cutting elements and the earth formation (Warren: Table 1 – depth as rate of penetration of each bit in m/s, cut area and formation as Fig.6; Also see Fig. 7-8); and calculating the volume of each of the craters from the expected depth of penetration and projected area of contact (Warren: Table 1 cut area and cut volume).

Regarding Claim 36

Warren teaches axial force acting on each of the cutting elements totals an axial force applied to the drill bit (Warren: Pg.119 Col.2 ¶1).

Regarding Claim 37

Warren teaches *an incremental axial movement of the drill bit corresponding to the incrementally rotating is adjusted to cause the axial force on each of the cutting elements to total the axial force applied to the drill bit* (Warren: Pg.119 Col.2 ¶1 – total axial force, Pg.119 Col.2 ¶6-7, Fig.5 & 8), the axial force acting on each of the

cutting elements determined with respect to a predetermined relationship between *depth of penetration* and *axial force applied for the cutting element geometry and the earth formation* (Warren: Fig.8).

Regarding Claim 38

Warren teaches predetermined relationship is determined by laboratory experiment comprising impressing a cutting element having known geometry onto a selected earth formation, while measuring force on the cutting element and a corresponding depth of penetration of the cutting element into the selected earth formation (Warren: Table 1) having cutter with known geometry (Warren: Pg.119 Col.1 ¶6) onto a selected earth formation (Warren: Pg.119 Col.1 ¶7 - Berea Sandstone).

Regarding Claim 45

Method claim 45 discloses similar limitations as claim 34 and is rejected for those limitations likewise. Additionally claim 45 discloses the step of adjusting. Warren teaches adjusting at least one of the bit design parameters, and repeating the calculating the crater volume, incrementally rotating and combining the volume until a difference between the combined volume cut by each of the cones is less than the combined volume determined prior to the adjusting the at least one of the bit design parameters as either changing the bit design or removing the cutter elements (Warren: Fig.2-6 – different bit designs; Fig.9-11- impact of cutter elements in the bit); and outputting the volume cut by each of the roller cones (Warren: Table 1 – cut volume by each cutter).

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Regarding Claim 46-48

Method claims 46-48 discloses similar limitations as claims 35-37 and are rejected for those limitations likewise respectively.

Regarding Claim 49

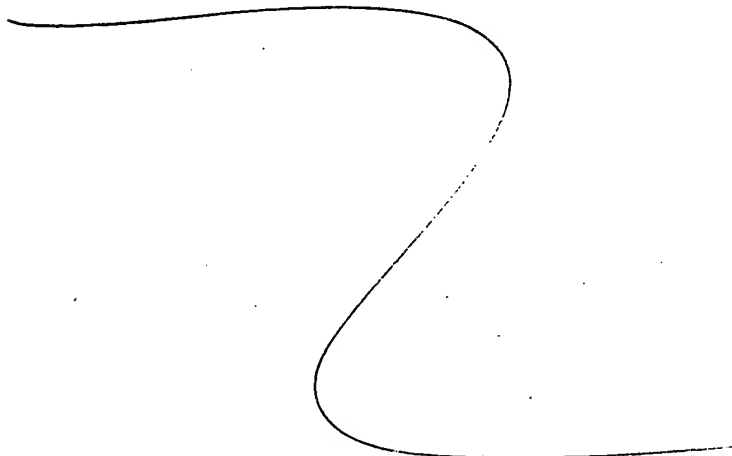
Warren teaches at least one bit design parameter comprises a number of cutting elements on at least one of the cones (Warren: Fig.1 at least).

Regarding Claim 50

Warren teaches at least one bit design parameter comprises a location of cutting elements on at least one of the cones (Warren: Fig.1 at least).

Relevant Prior Art

- *U.S. Patent 6,021,377 issued to Dubinsky et al teaches drilling simulation.*
- "The Computer Simulation of the Interaction Between Roller Bit and Rock", Ma, Society of Petroleum Engineers, SPE 29922, November 1995 teaches drilling simulation.



Conclusion

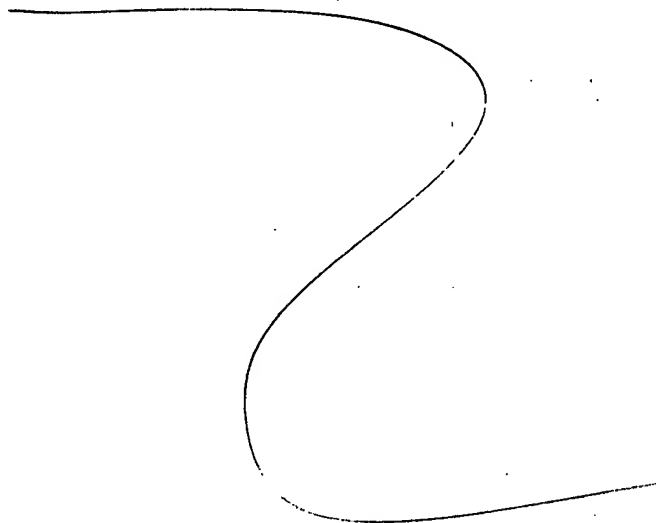
11. All claims are rejected.

12. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

13. **Examiner's Note:** Examiner has cited particular columns and line numbers in the references applied to the claims above for the convenience of the applicant.

Although the specified citations are representative of the teachings of the art and are applied to specific limitations within the individual claim, other passages and figures may apply as well. It is respectfully requested from the applicant in preparing responses, to fully consider the references in their entirety as potentially teaching all or part of the claimed invention, as well as the context of the passage as taught by the prior art or disclosed by the Examiner.

In the case of amending the claimed invention, Applicant is respectfully requested to indicate the portion(s) of the specification which dictate(s) the structure relied on for proper interpretation and also to verify and ascertain the metes and bounds of the claimed invention.



Communication

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Akash Saxena whose telephone number is (571) 272-8351. The examiner can normally be reached on 9:30 - 6:00 PM M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kamini S. Shah can be reached on (571)272-2279. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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